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ABSTRACT

"Ecology and Human Values" is an interdisciplinary course designed for senior year high school students in social studies and/or science. Its main thrust is the investigation of human values as they relate to the environment, although rooted in the natural sciences as a means of understanding the complexities inherent in the environment. Use is made of the case study approach to environmental issues (controversial questions) together with participatory research in the community. Multi-text, small group instruction, individual projects, and simulation techniques are also incorporated to develop an understanding and a corresponding value and behavior change in the inter-relationship of man to his biophysical and sociocultural environment. The course is outlined in eight units: (1) An Introduction To Crisis, (2) Ecology, (3) The Nature of Man, (4) Historical Perspective of Ecology, (5) Population, (6) Science-Technology, (7) Concerns Caused by Science-Technology, and (8) What is the Proper Role of the Scientist, Citizen, Industrialist, and Administrator? Each unit indicates the subtopics to be covered, objectives, generalizations, methodology, culminating activities, evaluation, resources, and supplementary information where appropriate. (BL)

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ECOLOGY AND HUMAN VALUES

Introduction

As he introduced the Environmental Quality Education Act in Congress last year, Senator Gaylord Nelson made the following statement:

> Education, I believe, is the only proper way to influence values, attitudes and basic assumptions in a democratic society. Behavior in the long run, can best be changed through the process of education.

The assumption made by Senator Nelson is that emphasis on environmental education, like the emphasis on science and math education after Sputnik I in 1957, will have a positive impact on our environment, in much the same way that the National Defense Education Act has had upon the critical subject areas. However, if environmental education is to be something of value, educators must come to grips with the central issue which Senator Nelson refers to -- value and attitude change. We must ask:

- What changes in values (behavior) are needed?
- Who will determine the direction of the value changes?
- Can schools affect fundamental value changes without concomitant changes in the larger community?

These questions should not stymie our efforts to deal with problems of the environment. Indeed, social studies educators should welcome the challenge of working with students in an already familiar area -- value analysis and controversial issues. If, as Senator Nelson suggests, our behavior toward our environment is based on unexamined values and faulty assumptions, then it should be the business of education, and particularly social studies education, to examine these values and challenge the assumptions. Teaching the process

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of value analysis may seem a large order, but the analysis of values is related to any topic that is controversial. As a matter of fact, we can define controversial issues as those questions which rest upon conflicting value-belief systems. Further, since conflicting belief systems or moral dilemmas abound in all areas of human existence, to suggest that the teacher of social studies not deal with the area of controversy (including environmental issues) is indefensible.

A rationale for the inclusion of environmental problems (controversial questions) in the social studies curriculum must be couched in terms of value clarification. This, it seems, is exactly what Senator Nelson suggested in his presentation to the Senate. Social conflict (controversial issues) has been categorized in many different ways. For example, Hunt and Metcalf argue that human conflict is of two types: intrapersonal and interpersonal. They suggest that intrapersonal conflict in individuals manifests itself in uncertainty as to what to believe or value. Individuals who are inconsistent or uncertain cannot engage in morally responsible behavior based upon intellectual understanding and personal commitment. Hunt and Metcalf argue that this uncertainty, this inconsistency, this inability to establish a commitment to anything is in large part due to the school's failure to deal with "closed areas" or controversial issues (certain areas of conflicting belief, i.e., social class, race relations, environmental problems, etc.). Raths, Harmin and Simon also suggest that the failure to clarify value positions can mean a continued existence of apathy, uncertainty, inconsistency and uninvolvement. Kenneth Keniston further claims that the "now" generation's attribute of uncommittedness is due mainly to their inability to clarify their values and commit themselves to them.

Thus, environmental issues (controversial questions) are an important and necessary area of study in the social studies if value-belief systems

are to be examined; and the analysis of value-belief systems is necessary if individual commitment toward the solution of enviornmental problems is to be achieved.

Without doubt, the handling of controversial issues can be one of the most difficult, and at the same time most important activities that a social studies class can engage in. The difficulty of handling issues in the classroom stems from the fact that three basic problems must be clarified before issue resolution can be achieved:

1. The problem of identifying and clarifying values which are in conflict and choosing among them (in public controversy, laws may also be in conflict);
2. The problem of clarifying the facts in the issue; and
3. The problem of clarifying the definitions of words used in the controversy.

In presenting issue controversy in the classroom, one of the best teaching strategies is the case study approach. Through the case study students can gain experiences dealing with value problems, definitional problems and factual problems which can help them develop what Don Oliver calls "principles of analysis."

Putting the controversial situation in a case study gives a sense of reality to the issue, and, more important, allows the student to discover (internalize) "principles of analysis" through practice.

In considering issues on environmental problems, the social studies teacher might look at the following*:

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*In dealing with the suggested issues here, as with any controversial issues, it is suggested that the conceptual framework of value problems, factual problems and definitional problems be applied. For example, in any of the issues studied, questions can be raised relative to the nature of the values that are in conflict, the facts involved in the issue and the definitions of words used in describing the issue or controversy.

1. It is believed that an annual economic (Gross National Product) growth rate of between 3% and 4% is necessary if the United States economy is to escape a depression; it is also believed that if the quantity of production is maintained or increases we will be faced with an irreversible environmental crisis.
2. It is believed that only the individual citizen can effectively control pollution; but it is also believed that we live in a highly organized society, a society of corporations and institutions where the individual is quite helpless.
3. It is believed that the government should trim spending; but it is believed also that large sums of money from the federal government will be necessary if pollution is to be controlled.
4. It is believed that population (too many people) and the processes used in trying to meet the needs of people is the major cause of pollution; but it is believed also that an increasing population means an increasing market which is important to the growth of any economy.
5. It is believed that the American society is one of the most mobile societies in the world, and this mobility is necessary in providing economic opportunities for our citizens; but it is also believed that the American pre-occupation with movement has interferred with our ability to develop more stable families, communities and institutions.

The above list of issues is suggested as a point of entry into the study of environmental problems which, above all, is the study of alternative actions based on a careful analysis of the facts and the values present in the issue.

"Ecology and Human Values" is a program designed for high school students in social studies and/or science. Its main thrust is the investigation of human values as they relate to the environment. But, it is also a program that is rooted in the natural sciences and draws heavily upon (natural) science as a means for understanding the complexities inherent in said environment. Much use is made of the case study approach as well as participatory research in the community. Above all, this program attempts to encourage students to make judgments about their environment relative to its beauty and ugliness; and, further, to allow students to make suggestions relative to how they would go about creating a better quality environment for all citizens.

Getting Started

In developing an interdisciplinary course such as Ecology and Human Values several factors must be considered. Obviously, a need must be felt. There must be a sincere belief by the teachers involved that the material and methodology being developed is of utmost importance for present and future generations.

Once this concern is felt, cooperation in the form of encouragement, time and money must be sought from the administrators and board of education of the school district. Time must be available if proper analysis and creativity is to come forth.

If the teachers involved in developing a course in environment and values do not feel fully qualified, the first step that must be taken is to seek further formal education, either through extension classes or summer school. This additional education would enhance the knowledge and skills necessary in developing such a course.

At this stage, the staff can select the subject areas to be included. When this has been done, specific objectives, as well as generalizations for each area, should be developed. When teachers from different subject areas, such

as science and social studies in this particular instance, work together in developing objectives, there will be times when disagreement will arise. This is a healthy situation. Through discussion and analysis of the disagreements, better objectives will be developed.

The next step is to collect and analyze information pertinent to each unit. This would include information dealing with science as well as information dealing with values.

When the information to be dealt with is selected, the next step is deciding what methodology will provide a correlation between the physical sciences and values, as well as affording the student the opportunity to use various techniques in the learning process.

In a value-laden course, it is important that students are given several alternative processes to choose from.

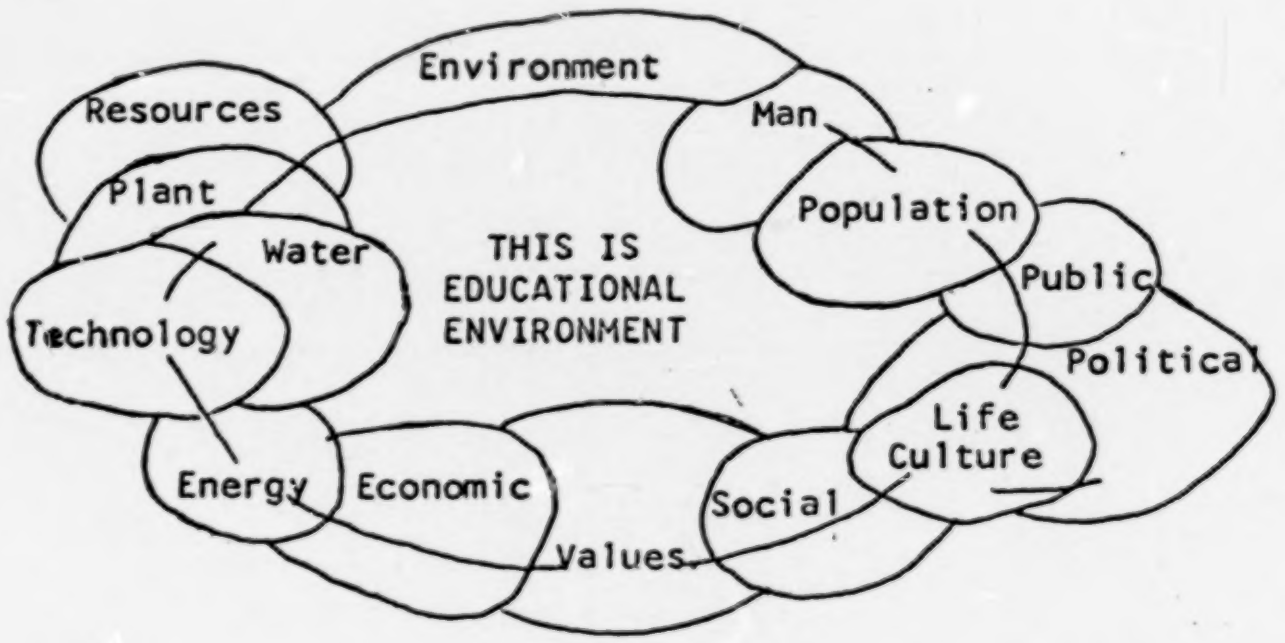
With the methodology selected, the staff must then decide what resources should be made available for the methodology to be implemented and to make possible the attainment of the stated objectives.

The teachers involved must be careful to select materials that reflect alternative values rather than the biases of the instructors.

Because of the controversial nature of the issues that must be confronted, it is imperative that the School Board and the Administration are aware of the issues being confronted and how they will be handled.

Once the course is implemented, constant planning and coordination, as well as evaluation, must occur among the staff members, if an optimum learning environment is to be maintained.

One of the significant phenomena of our times is the public's increasing awareness of the many problems which have arisen from the impact of science-technology on society. One characteristic of science-technology generated problems such as the population explosion, destruction of the environment, the bomb, potential genetic engineering, urban chaos, the anomaly and placelessness of modern man and so on, is that to be adequately understood they must be examined on an interdisciplinary basis. Causes for these problems must draw upon material that is biological, sociological, political, and humanistic.



If science-technology has produced some undesirable as well as desirable effects in the natural environment of man, these undesirable effects must, first of all, be recognized, and secondly, change must take place. Change, at least to the extent that some sort of balance is established between benefit and risk in the short-run and long run.

Change in the behavior of man towards nature comes primarily when a change in values occur. The relationship between knowledge, values, and change will be the constant theme running through the course.

Cyclical diagram credit to Dr. David Archbald

Class Make-Up

The course, Ecology and Human Values, will be an interdisciplinary course taught cooperatively by a biology teacher and a social science teacher. The course will be an elective for one semester during a student's senior year of high school. The seminar approach will be the chief method of instruction. Science-technological forces in our environment will be analyzed as to impact on nature as well as to the impact on the value system of human beings. A variety of instructional methods will be used. Multi-text, small group instruction, individual projects and simulation techniques will all be incorporated to develop an understanding and a corresponding value change and performance in the inter-relationship of man to his biophysical and sociocultural environment.

Generalizations

A. Education exists to change the behavior of the learner.

B. In order to change the behavior of man, attitudes and values must be changed beforehand.

C. Values depend on knowledge.

D. One must always consider the opportunity costs involved in all choices of behavior contemplated.

E. At times, costs, economic, social, or moral, are not forseeable at the time a decision must be made.

F. Wants and desires of people and institutions have an influence on the decision making process.

G. The environment of man is a combination of nature and man-made institutions which interact to determine the quality of life now and in the distant future.

H. Because of different human values and priorities, conflict will at times arise between different value systems as to which choices should be made.

I. Through an enlightened public, choices can better be made in an objective, intelligent manner.

WHERE DO YOU STAND?

Directions: Please answer the first thirteen questions by placing in the blank to the left of the question the number that describes your attitude as follows:

(1) Strongly agree
(2) Agree
(3) Uncertain
(4) Disagree
(5) Strongly disagree

_____ 1. I believe that plants and animals exist primarily for man's use and enjoyment.

_____ 2. With advances in technology, I think that man will always be able to draw the resources he needs from the environment.

_____ 3. I think that pollution and racism are both part of the same basic problems in our society.

_____ 4. I do not think that I am personally responsible for our present state of pollution.

_____ 5. I am afraid that industrial and military plans to exploit the ocean's resources may seriously endanger human life on this planet.

_____ 6. I think that owners of private property should be free to use the plants and other natural resources on it pretty much as is now permitted by law and convention.

_____ 7. I believe that the profit motive in our society (desire for individual economic gain) is now outdated and must change.

_____ 8. I feel that our environmental problems probably cannot be solved by existing American political and economic institutions.

_____ 9. I think that all American families, regardless of social or economic position, must limit the number of children to two, or three at most.

_____10. I believe that our ecological crisis can be solved primarily by application of technology.

_____11. I feel that American beliefs and values have been a basic cause of our present environmental problems.

_____12. I believe that economic growth is nearly always good for any community.

_____13. I think that population control should be encouraged by removing tax exemptions for more than two children.

Please complete the rest of the questions by placing in the blank to the left of the question the number of the statement that best describes your opinion.

_____14. Do you feel that wild animals have any rights?
(1) Yes, equal to man's
(2) Yes, but subordinate to man's
(3) Undecided
(4) No

_____15. Have you ever been in a wilderness area beyond all roads and human habitation?
(1) Yes
(2) Uncertain
(3) No

_____16. If so, do you feel yourself to be different when you are in a wilderness area than when you are in a more man-made environment?
(1) Yes
(2) Undecided
(3) No

_____17. How do you see yourself in relation to the influential and powerful groups in your community?
(1) I am part of them and have a voice in decision making.
(2) I feel part of them even though I do not make decisions.
(3) I am part of them but dislike it.
(4) I am outside of them but not opposed to them.
(5) I am outside of them and dislike them.
(6) I am outside of them and actively oppose them.

_____18. How do you feel about the movement within the churches to increase active involvement in social problems?
(1) Strongly agree
(2) Agree
(3) Uncertain
(4) Disagree
(5) Strongly disagree
(6) I do not know enough about it to answer.

_____19. How do you feel about the peace movement (anti-Viet Nam war)?
(1) I support it and am active in it.
(2) I favor it generally but have not been active in it.
(3) I am uncertain how I feel.
(4) I agree with its goals but disapprove of its methods.
(5) I disapprove of the movement but am against repressive action.
(6) I disapprove and would like to see the movements suppressed.

_____20. How do you feel about the student movements in colleges?
(1) I support them and am active in them.
(2) I favor them generally but have not been active.
(3) I am uncertain how I feel about them.
(4) I agree with their goals but disapprove of their methods.
(5) I disapprove of the movements but am against repressive action.
(6) I disapprove and would like to see the movements suppressed.

_____21. How do you feel about the Black Power movement?
(1) I support it and am active in it.
(2) I favor it generally but have not been active.
(3) I am uncertain how I feel.
(4) I agree with the goals but disapprove of the methods.
(5) I disapprove of the movement but am against repressive action.
(6) I disapprove and would like to see the movement suppressed.

_____22. How do you feel about the conservation and ecology movements?
(1) I support them and am active in them.
(2) I favor them generally but have not been active.
(3) I am uncertain how I feel.
(4) I agree with the goals but disapprove of some of the methods.
(5) I disapprove of the movements but am against repressive action.
(6) I disapprove and would like to see the movements suppressed.

_____23. Do you think that there is any connection between all of these various movements in our society?
(1) They are all aspects of one single wave of revolutionary change.
(2) They may be related but are still separate movements.
(3) I am uncertain what I think.
(4) There is no connection between them.

_____24. Write in the space provided the numbers of any of these methods of influencing decision-makers that you would approve of:
(1) Writing letters to government officials.
(2) Speaking at public hearings.
(3) Lawsuits against corporations, government agencies, or individuals guilty of environmental negligence.
(4) Boycotts against companies that pollute.
(5) Rallies, marches, demonstrations.
(6) Nonviolent direct action such as sitting in front of bulldozers.
(7) Citizen take-overs of offices of government agencies or industries to enforce demands.
(8) Destructive (violent) action, if other means failed (such as sabotage or bombings).

SOURCE: Natural History Magazine, Luther P. Gerlach and Virginia Hine

I. AN INTRODUCTION TO CRISIS

A. Environmental Threats to Man

1. Pesticides
2. Oil
3. Radiation
4. Chemicals
5. Drugs
6. Depletion of natural resources
7. Landscape degradation

B. Pollution

1. Air
2. Water
3. Solid Waste
4. Thermal
5. Noise
6. Aesthetic

C. Over-population

1. Numbers of people
2. Food production
3. Limits of earth

D. Human Values

1. Social
2. Political
3. Economic

E. "A life not worth questioning is not worth living"

OBJECTIVES:

A. Student becomes aware of the elements influencing environment.

B. Student senses the urgency of environmental problems.

C. Student develops an overview of environmental crisis and values related to the crisis.

METHODOLOGY:

A. Write a paper titled "Environmental Crisis: Something Real, A Cop-Out, or a Passing Fad"?

B. Analyze your position and studying the results of attitudinal questionnaires given to you.

C. Read and be ready to discuss the handout "A Fable For Tomorrow".

D. Write a paper showing what you think is the most pressing ecological problem today and why.

E. Read: "Fighting to Save Earth From Man", Time, 2/2/70

FILMSTRIP:

A. "Crisis of the Environment" (New York Times Book & Educational Division)

FILM:

A. "What Are We Doing To Our World" (McGraw-Hill) - examination of way technology is altering our environment

TAPE:

A. "The Politics of Ecology" (Addous Huxley)

II. ECOLOGY

A. Definition
B. Significance
C. Web of life
D. Releaser-Action
   1. food webs
   2. biochemical cycles
   3. energy flow-pyramids of energy, mass, nos.
E. Communities and Ecosystems
   1. Human vs. Natural ecosystems
   2. Interspecies relationships
   3. Succession
   4. Niches
F. What is Nature
   1. Western view
   2. Eastern view
G. Purpose of Environment
   1. Christian-Judeo view toward nature
   2. Genesis 1:2-30, its interpretation
   3. Contemporary values of man
      a. Is there really a necessity to be so concerned with environment today?
      b. "To live is to pollute"
      c. "Doomsday" view vs. "New Religion" view
   4. Spaceship Earth Philosophy
H. Commoner's 3 Laws of Ecology
   1. Everything is connected with everything else
   2. Everything goes somewhere
   3. There is no such thing as a free lunch
      a. Every benefit that is introduced to improve happiness, our welfare, or our security has a cost factor some place.
      b. Measure benefits against risks.

OBJECTIVES:

A. Student comprehends the ecosystems.

B. Student critically analyzes the contrasting views of what is natural and the purposes of nature.

C. Student compares and contrasts the affect of divergent views on the role of natural environment and man.

D. Student appreciates the natural environment and recognizes the particular contribution made by the elements of nature.

E. Student recognizes the complexity of nature and the ramifications of innovations.

F. Student learns to better function within his environment as a living organism.

GENERALIZATIONS:

A. Living things are interdependent with one another and their environment.

B. Man has been a factor affecting plant and animal succession and environmental processes.

C. Modern man affects the structure of his environment.

D. Natural resources are interdependent and the use or misuse of one will affect others.

E. An organism is the product of its heredity and environment.

F. Man is influenced by many of the same hereditary and environmental factors that affect other organisms and their populations.

G. The rate of change in an environment may exceed the rate or organism adaption.

H. All living things, including man, are continually evolving.

I. Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition.

METHODOLOGY:

A. Read Genesis 1:28-30, wirte a paragraph on what it means to you.

B. Read Chapter 13 in "Science and Survival".

C. Through investigation, compare and contrast the ecosystem of man with that of another living organism.

D. Read and write a critical review of "Man's Control over Civilization", Leslie White.

E. A panel discussion on the merits and demerits of the "Naked Ape".

F. Read, and write a critical review of "The Good Earth and the Golden Rule" - National Parks, January, 1970.

G. Read article: "Small Thoughts"

H. Read one of the following references:

1. The Pyramid of Living Things, Edith Raskins
2. The Environmental Handbook, Garrett Debell, ed.
3. The Balance of Nature, Louis & Margery Milne
4. Biology or Oblivion, Brian Hocking
5. A Talk with Konrad Lorenz, a handout
6. The Web of Life, John Storer

I. DISCUSS:

1. What is meant by the statement: "What can be more relevant than personal survival?"
2. How may mass suicide result from pollution?
3. How may the world of mankind slowly be extinguished by poison?
4. How may all people on earth choke to death?
5. Why should man fear pollution more than the atom bomb?
6. How is the earth headed for "uglification" instead of beautification?
7. Why may future earth men need spacemen's equipment to survive on this planet?

J. Develop a series of slides and a tape on pollution in Dane County.

CULMINATING ACTIVITIES:

A. Pick ten influences that have affected the ecosystem of man and develop a paper on the effects of those influences on the stability of nature.

B. Using evidence to substantiate your position, react negatively or positively to the hypothesis "Man is distinctive enough to be excluded from the field of nature."

EVALUATION:

A. Class discussion on readings.

B. Objective test based on basic biological knowledge.

C. Evaluation of assigned papers.

4 attack submarines $45,000,000 each	Would Pay For	1 year of agriculture aid ($178,699,760)
1 atomic sub. - missiles	"	$132,095,000 in Famine relief aid (Includes freight)
1 atomic sub + missiles	"	$150,000,000 in technical aid
1 $275,000,000 aircraft carrier	"	35 school buildings at $4,000,000 each
1 $250,000,000 108 Missile Base	"	1 1,743,000 KWH capacity H. E. Dam
14 jet bombers at a cost of $8,000,000 each	"	A school lunch program serving 14 million children
1 new Prototype bomber fully equipped	"	250,000 teacher salaries this year 30 science faculties each with 1,000 students 75 (100 bed) hospitals fully equipped 50,000 tractors - 15,000 harvestors

What it costs to run the Pentagon for 2 1/2 hours = current annual expenditures on pollution control research

2 B-52 bombing runs in Viet Nam = annual expenditures on population research

Be fruitful, and multiply, and replenish the earth, and subdue it; and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth. And God said, behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat. And to every beast of the earth and to every fowl of the air, and to everything that creepeth upon the earth, wherein there is life, I have given every green herb for meat: and it was.

Genesis 1:28-30

The state of man today is one of enormous expansion, rapid evolution, and earthwide impact. Some 300 generations have passed since man began a new life, tilling the earth and settling in villages. Now, within a single generation, man will become an urban species, with over half of the six billion persons in A.D. 2000 living in hivelike cities. Thus may end the 35,000-year span of homo sapiens and begin the era of homo convivens, a new communal species that would control its reproduction and manage its ecosystem - the biosphere.

RESOURCES:

Filmstrips:

a. Ecology and Survival

b. Science and Technology

Film:

a. "The World Around Us" - NBC (Introduction to science of ecology and its importance to today's world)

Tape:

a. "Survival"

III. THE NATURE OF MAN

A. Distinctive characteristics of man

1. Structural-physiological-behavioral

2. Environmental-human freedom

3. Reaction to external forces

4. Abstraction-creativity

B. When does one become human?

1. What does human mean?

2. Machinery of atoms

3. Cultural contributions

C. What is so virtuous about being human?

D. Is life important? If so, why?

E. Life for whom, the butterfly or humans?

F. If life for humans is most important, all humans or "certain" humans.

1. Area of eugenics

2. What determines the value of a human

3. What determines the value of other living organisms

G. How long a life

1. Should humans strive to live forever

2. If forever is too long, how long is enough

H. Three theories on life

1. Biological-clock theory

2. Cumulative-poison theory

3. The loss of control theory

I. Does man have a right to control nature even at the expense of other living organisms.

1. "Shade of an elm tree or the song of a robin".

What is meant by the "quality of life" or "life styles".

1. Is there one life style superior to another.

2. What factors determine one's view toward the quality of life.

OBJECTIVES:

A. Student recognizes the features of man that separate him from other living organisms.

B. The student can research the various views towards the meaning of being human.

C. The student, through knowledge, can develop attitudes and values about life for humans in the realm of length of life, types of life, and quality of life.

D. The student participates cooperatively with other humans because of a set of values which entail the well being of all humans living now as well as respect for providing opportunities for those not yet born.

GENERALIZATIONS:

A. The management of natural resources to meet the needs of successive generations demands long-range planning.

B. A knowledge of social, physical, and humanities are important for environmental understanding.

C. Options available to future generations must not be foreclosed.

D. Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

E. The form of life present depends upon the coincidence of the life needs and their availability in an environment.

F. Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition.

G. Wildlife populations are important economically, easthetically, and biologically.

H. Wildlife is considered to be a public resource.

I. Man has responsibility to develop an appreciation of and respect for the rights of others.

J. Human resources include the physical and mental abilities with which man is endowed and the knowledge he has generated.

K. An individual must develop his ability to preceive if he is to increase his awareness and develop environment perspective.

L. Individual's perceive different self-roles depending upon their position in the social and environmental context.

M. Man is a high animal form because of his ability to reason.

METHODOLOGY:

A. Write a short paper on what in man you feel is most important in determining if he is "human".

B. Write a critical review of "So Human An Animal" by Dubos.

C. Investigate what a "biological clock" is and what types there are for man.

D. How isolated can a person be before he begins to show what most of us would call abnormal behavior? Check reading materials to see what happens when someone is removed from all environmental stimuli for a period of time.

E. Compare man to some other living organism and differentiate what makes each different from the other.

F. With this differentiation, determine through your value system which deserves priority in the use of the environment.

G. Pick five aspects of what you feel is the "good life" and list the social cost involved in each aspect picked.

H. Pick a sociology book or books and research the scientific date on what is instinctive and what is learned by man.

I. Ask a clergyman his interpretation of Genesis 1:28-30 and if he feels man has an inherent right to exploit other living organisms. Be prepared to react in class to the rationale the clergyman gave you.

J. Panel discussion on the advantages of being a human being rather than a horse.

K. Read "Warty Bliggins, The Toad" - be able to interpret and discuss its relevance to man. Either write a poem symbolizing man's view toward nature today or draw parallels between the toad and man.

CULMINATING ACTIVITIES:

A. Bring to class a list of ten living organisms which come closest to being human, rank them one through ten with number one being closest, etc.

B. Debate: "War is a biological characteristic of man".

EVALUATION:

A. Class discussion

B. Evaluation of papers assigned

C. Evaluation of performance in panel and debate

D. Essay examination on a case study in which humanistic qualities must be identified.

SUGGESTED READINGS:

A. The Territorial Imperative, Robert Ardrey

B. The Human Zoo, Desmond Morris

C. Origin of Man, C. Loving Brace, (Natural History, January, 1970)

D. Prevalence of People, (Chapter 3-"Nature of Man"), Marston Bates

E. "Warty Bliggens, The Toad", (Poem), Don Marquis
(toad thinks he is center of universe - interesting parallels)

FILMS:

A. "Animal War, Animal Peace" (aggression, restraint in other species)

B. "Coming of Man" (evolution of man)

C. "How Man Adapts to His Physical Environment" (McGraw-Hill)

FILMSTRIP:

A. Man: Values and Goals

IV. HISTORICAL PERSPECTIVE OF ECOLOGY

A. Examples of the past

1. Louis LeRoy - 1575

a. mariner's compass - Columbus' Crew

b. printing press - intellectual crisis

c. gunpowder and firearms

2. Thomas Jefferson - Coast and Geodetic Survey

3. Alexander Hamilton - Coast Guard

4. Theodore Roosevelt - classic conservationist

   a. Department of Interior

5. Franklin Roosevelt - dust bowl

B. Divergent views of different cultures towards environment

1. primitive man

2. industrial man

OBJECTIVES:

A. The student can independently research the patterns of living organisms of past years.

B. The student can differentiate between the value systems of divergent cultures.

C. The student is better able to make intelligent value judgments based on the action and ramifications of past experience of living organisms.

GENERALIZATIONS:

A. A knowledge of the social, physical, and biological sciences and humanities of the past is needed if one is to understand environment today.

B. To better decrease the chances of mistakes, one must recognize and understand the past risks taken and limitations experienced, when manipulating the natural environment of today and tomorrow.

C. A cultural and time lag exists between the development of knowledge in science and technology and application of that knowledge to resource and environmental problems.

D. Resource depletion can better be slowed by the study of the development adoption, and effects of alternatives used in the past.

E. Organisms and environments are in constant change.

F. All living things are continually evolving.

G. Historically, cultures with high technological development have used more natural resources than those with lower levels of technological development.

H. To understand the views and uses of environment of any society, past or present, one must have a knowledge of the values of that society.

METHODOLOGY:

A. Pick one impact of natural environment that occurred at least 300 years ago and point out the effects on nature.

B. Read and be able to discuss the handout "Historical Roots of Our Ecological Crisis", Science Magazine, March 10, 1967, Lynn White

C. Take three man-made influences that affected environment from 1800 to 1890 and from these influences, attempt to describe the values of the landvesters and the "grassroots" American.

D. Read the historical section of the article, "A Talk with Conrad Lorenz" and write a critical review of it.

E. A panel presentation of the continum of man's views and effects on his natural environment.

F. Immediately after the panel, a presentation of a continum of the value system of man without any consultation between the two panels beforehand.

G. Using microfilm, develop a paper, using evidence, your views of the values of the American since 1900 by examining the technology and science articles printed in the New York Times newspaper.

CULMINATING ACTIVITY:

A. Interview at least three people over 65, asking them what specific benefits technology and science have given us. Make sure they specify the particular changes they mean and also have them attempt to tell you the drawbacks or social costs involved in each.

EVALUATION:

A. Evaluation of written papers.

B. Class discussion participation.

C. Objective test on historical innovations and effects.

D. Essay examination on a specific scientific impact and what values of man can be seen through this impact.

RESOURCES:

A. Film

1. "A Matter of Time" (27 minutes - a history of environmental deterioration)

Conservation Foundation
1250 Connecticut Avenue, N.W.
Washington, D. C. 20036

V. POPULATION

A. Population pressures on Man's natural environment.

1. Man as a member of a biological community

2. The law of population increase

3. The American environment

4. Over-population and genetic selection

5. The population explosion and the natural environment

B. Population pressures on economic and political trends

1. The human use of human beings

2. Population density and social pathology

3. Population increase and economic development

4. Industrial growth in the 20th century

5. Man's supply of food

6. Environmental planning for an increased population

7. Over-population and the new nations

8. Population pressures and peace

9. The menace of over-population

C. Population pressures in specific areas

1. The promise of agriculture in the less developed lands

2. India's dilemma

3. Japan's solution

4. Latin America's prospects

D. The population problem and religion

1. A Catholic view

2. A Protestant view

E. Population pressures on morals and ethics

1. A naturalist's looks at over-population

a. Treat the symptoms or the disease?

2. A medical aspect of the population problem

3. The "Good Life"

4. "Too Many People" - Julian Huxley

F. Possible Solutions

1. Zero Growth Rate

2. Negative Growth Rate

3. Eugenics

4. Abortion

5. Sterilization

OBJECTIVES:

A. Student can objectively investigate the relationship of numbers of people and environment.

B. Student comprehends the present trends in population throughout the world.

C. Student can analyze the possible alternatives available in the area of quantity and quality of population.

D. Student, through values developed by the use of knowledge is an active citizen in the area of population quality.

GENERALIZATIONS:

A. Man's need for food, fiber, and minerals increases as populations expand and levels of consumption rise.

B. Management is the result of technical and scientific knowledge being applied in a rationale direction through the use of values.

C. Increased population mobility is changing the nature of the demands upon some resources.

D. Options available to future generations must not be foreclosed.

E. The economy of a region depends on the utilization of its natural, human, and cultural resources and technologies over a period of time.

F. The distribution or location of resources in relation to population is critical to problems of resource conservation and use.

G. The political and economic strength of a country is in part, dependent upon its access to domestic and foreign resources.

H. Conservation policy is determined by the interaction of science and technology; social and political factors, and aesthetic, ethical, and economic considerations.

I. Increasing population and per capita use of resources have brought changed land to man or resource to population ratios.

J. The interaction of environmental and biological factors determine the size and range of species and populations.

K. Natural resources, water and minerals in particular, are unequally distributed with respect to land areas and political boundaries.

L. Natural resources are affected by philosophy, religion, government, and the arts.

M. If there is a breeding stock available, animal populations are renewable resources.

N. As populations increase competition for the use of water increases resulting in a need for establishing water use priorities.

O. In a democracy, a basic theory is that increasing restrictions on resource allocation, directly or indirectly, and use are imposed by the consent of insistence of the people.

P. Human resources include the physical and mental abilities with which man is endowed and the knowledge he can generate.

Q. Family planning and the limiting of family size are important if overpopulation is to be avoided and a reasonable standard of living assured for successive generations.

R. Population growth increases the probability of a lethal world wide plague; each of which is potentially capable of destroying civilization and even of driving Homo Sapiens to extinction.

METHODOLOGY:

A. Read The Population Bomb and write your reaction to the eleven inalienable rights developed by Dr. Ehrlich.

B. Compare and contrast the ethos of a relatively over-populated nation with a country which does not have a population problem.

C. Debate: "Birth Control is/is not a form of murder."

D. Debate: "A negative birth rate or a zero population growth are/are not morally acceptable."

E. Invite a doctor to talk on the physiological nature of a fetus in regard to when "life" begins.

F. Invite a lawyer to talk on the legal rights of an unborn child.

G. Invite a Catholic clergyman and a Protestant clergyman and a Jewish Rabbi to present their views on population control.

H. Read article: "I'm in the Mood for Badminton" - A Planned Parenthood Song" and be ready to react to it.

I. Read Chapter 1 in Terracide, "Life In A Crowd"

J. Suggested readings (you must read four of the following):

1. Our Crowded Planet, Fairfield Osborn
2. The Problem of Population, George Shuster
3. The Prevalence of People, Marston Baten
4. Our Overcrowded Planet, Tadd Fisher
5. Scientific American, August 1964, "Population Control in Animals"
6. Scientific American, September 1963, "Population"
7. Scientific American, February 1962, "Population Density and Social Pathology"
8. Life, January 9, 1970, "Problem of People Pollution"
9. Natural History, January 1970, "The Proliferation of Species"
10. New Republic, October 25, 1969, "Feeding the Hungry"
11. Life, January 9, 1970, "Squeezing into the 70's"
12. Life Reprint Series, "Cities for Tomorrow"

K. Discussion Questions - be able to answer:

1. Why might over-population lead to revolutionary activity or political unrest?
2. Have the advancements of medical science been a true blessing to the world?
3. Will "green revolution" provide enough food to take care of world's population growth?
4. Is there an answer to population growth problems in space exploration?
5. Who should decide how many children a family may have?
6. Would you agree to being legally prevented from having more than a fixed number of your own children?
7. Is the population explosion responsible for environmental pollution? Cite some examples.

CULMINATING ACTIVITIES:

A. Write a paper on the relationship of quantity of people to quality of life and develop what priorities must rule and through documentation, why you feel this way.

B. Write a paper on how to restore the balance between human population and natural environment on this planet.

RESOURCES:

A. Filmstrip

1. "Population Explosion-Crisis of Environment" (New York Times)

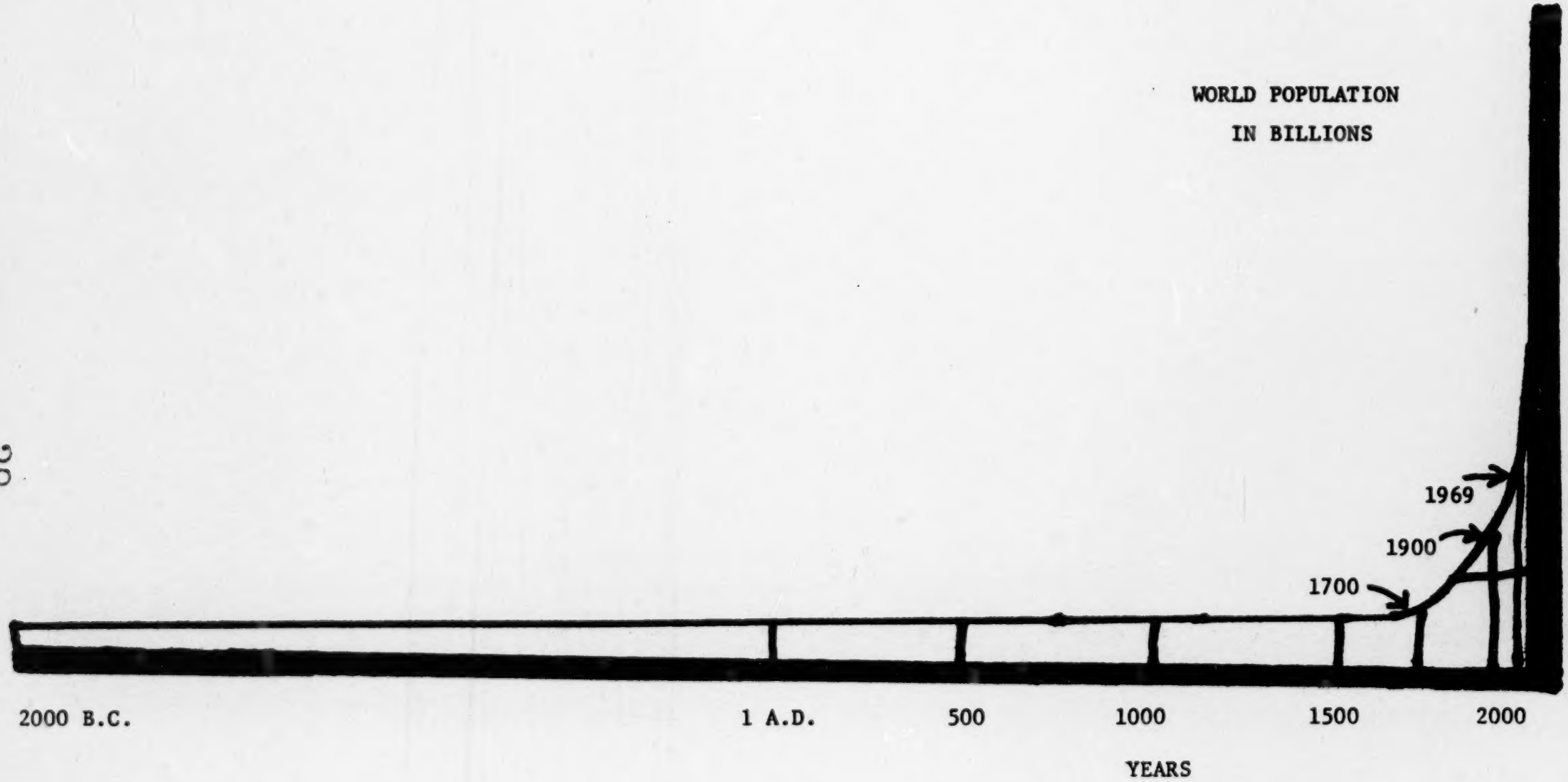
B. Films:

1. "Challenge to Mankind" - (15 world experts speak on threat of over-population) Contemporary Films

2. "Multiply and Subdue the Earth" - (world population crisis) Indiana A-V Center

C. "Population Ecology" - Britannica

D. "Standing Room Only" - (examines increasing population, exploiting oceans, increased agr. activity, and advising present methods of birth control) McGraw-Hill


WORLD POPULATION
IN BILLIONS
1969
1900
1700
2000 B.C.
1 A.D.
500
1000
1500
2000
YEARS

WORLD POPULATION

1970	1975	1980	1985
3,631,827,000	4,021,863,000	4,456,949,000	4,933,975,000

These population figures are the median of three estimates made by the United Nations.

	1970	1975	1980	1985
Africa	344,415,000	399,105,009	456,453,000	529,395,000
1. Western	101,200,000	115,575,000	133,186,000	164,445,000
2. Eastern	97,882,000	111,862,000	128,758,000	149,212,000
3. Middle	35,893,000	40,385,000	45,787,000	52,463,000
4. Northern	86,608,000	101,499,000	119,385,000	140,093,000
5. Southern	22,832,000	25,834,000	29,387,000	33,592,000
East Asia	929,932,000	1,011,110,000	1,096,157,000	1,101,722,000
6. Mainland	765,386,000	832,387,000	901,354,000	973,026,000
7. Japan	103,499,000	109,948,000	116,547,000	121,346,000
8. Other	61,047,000	68,875,000	77,666,000	87,350,000
South Asia	1,125,944,000	1,298,219,000	1,486,243,000	1,653,526,000
9. Middle	761,809,000	875,462,000	1,001,045,000	1,198,874,000
10. Eastern	286,925,000	330,933,000	380,871,000	484,394,000
11. Western	77,210,000	89,324,000	104,327,000	122,258,000
12. USSR	242,612,000	265,584,000	270,634,000	286,882,000
Europe	462,117,000	479,369,000	497,061,000	515,016,000
13. Western	148,619,000	153,359,000	158,214,000	163,316,000
14. Southern	128,464,000	134,213,000	140,059,000	145,963,000
15. Eastern	104,081,000	108,227,000	112,392,000	116,148,000
16. Northern	80,953,000	83,570,000	86,396,000	89,599,000
17. North America	227,572,000	242,771,000	260,681,000	200,379,000
Latin America	283,251,000	326,134,000	377,170,000	434,634,000
18. Caribbean	25,783,000	28,801,000	32,145,000	35,881,000
19. Mid-America	67,431,000	79,938,000	94,704,000	112,094,000
20. Tropical	150,659,000	175,159,000	203,591,000	235,947,000
21. Temperate	39,378,000	42,936,000	46,730,000	50,712,000
Oceania	19,371,000	21,561,000	14,024,000	26,596,000
Australia, New Zealand	15,374,000	16,982,000	18,789,000	20,745,000
Melanesia	2,767,000	3,147,000	3,583,000	4,120,000
Polynesia, Mirconesia	1,230,000	1,432,000	1,656,000	1,931,000

VI. SCIENCE-TECHNOLOGY

A. What science is

1. Classical biology

2. Molecular biology

B. Recent contributions made by science

C. Contemporary problems in science

1. Imposed secrecy

a. military

b. profit motive

c. nationalism

d. diminishing freedom to choose area of study

2. Secrecy in science makes it difficult to erase the mistakes science has made.

D. Technology

1. What technology is

2. Inter-relationship between science and technology

3. a. dependence of technology upon science

b. legitimizing technological innovation

4. Cybernetics

a. as the tempo of change intensifies one finds it increasingly difficult to maintain traditional modes of life and patterns of thought.

b. is it possible that machine and man are or can exchange roles

5. Impact on human values

a. ability to adapt

b. does man become non-humanistic

c. all transitions involve degrees of suffering - what impact does this have on man?

d. does a society have an obligation to those of its members who are engulfed by the tide of technological progress?

e. do machines cause men to prefer material things

f. do machines weaken men because of their dependence upon them

g. will man's devotion to machines result ultimately in his total subervience to them

h. must there be a concommitant elevation of man's moral standard and spiritual life

i. boredom

1. does man need a sense of fulfillment in creative group activities?

2. is creative satisfaction being denied because of technology

3. what do "anonymously" produced goods do for the workers who produced them

4. does man need an atmosphere of adventure and expectancy

5. does this type of exhilaration help man to free himself from the bondage to matter

6. boredom is not easy to define or recognize; it often masquerades in the passive forms of entertainment, in the dreary hours of aimless driving, in anonymous holidays which have lost their meaning

7. it seems as if the will to live - the eagerness to overcome the varied and inescapable problems of existence - is often weakened by physical comfort and wherever the cushion of government has been made too soft

8. what is the proper concept of work - is it the age of intellect, of brain, is brain "King" and machinery the "King's" prime minister

E. Different views on the effects on human values

1. removes man from ignorance

2. man has submerged his true spiritual nature in order to gain material benefits and he will ultimately destroy himself.

3. science must advance, but the technological change which it spawns must be subject to some kind of control in order that basic human values are preserved

F. Science is a part of human activity with the being only that it is explicit and systematic.

1. This is very striking when we come to problems of right judgment and good conduct.
2. Science cannot exist without values - truth is a value.
3. Science itself depends for its life on the prior acceptance of certain fundamental values, such as the value of curiosity and learning, the value of truth, the value of respect for facts.
4. As science rests on certain values, so do almost all values depend on knowledge, and thus to some intent in turn on science.
5. This implies a circular chain of causation or a feedback process, as do many processes of social and cultural development.
6. The duty to have good intentions is meaningless without the duty to try to know the facts and to try to foresee correctly the consequences of one's deeds.
7. Thus, science needs values and values need knowledge.
8. But what about timing - Einstein's principle of relativity or Chadwick's discovery of the neutron, or Hahn's work on uranium fission - if ten years later, no Hiroshima?
9. What is the use of a scientific discovery?
   a. Impossible to foretell the eventual good or evil
   b. Ben Franklin's analogy - "What is the use of a baby?"

G. Do scientists have an obligation to investigate all possible evils of their work?

1. Contemporary
2. Future generations

3. The choice of the balance point between benefits and hazard is a value judgment; it is based on ideas of social good, on morality or religion -- these are not scientific processes.
   a. level of tolerance is a social problem and must be resolved by social processes.
   b. we are going to have to tell scientists to stop doing some things
   c. "Harvard scientists who created something and then said, 'gosh, should we have done it?'"

OBJECTIVES:

A. Student can differentiate between what knowledge is scientific and what is not.

B. Student can comprehend the different definitions of science.

C. Student has the ability to correlate science with technology.

D. Student can analyze the effects of the machine on man.

E. Student differentiates between mechanization and automation.

F. Student critically analyzes the views towards the impact of science-technology of human values.

G. Student develops the ability to control technology and science rather than allowing science and technology to dominate him.

GENERALIZATIONS:

A. Control of environment is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

B. There is no technological panacea for the problems related to the environmental crisis.

C. The basic solutions involve dramatic and rapid changes in human attitudes.

D. The innovation of a machine has an impact on the value system of man.

E. With the use of technology, a social cost is involved which at times may be greater than the benefits of technology.

F. Knowledge of the social structures, institutions, and culture of a society must be brought to bear on environmental considerations.

G. Technology helps determine the self-role perceived by an individual towards his environment.

H. Man is continually developing an ethical base for making value judgments.

I. Man performs some tasks at a high psychological cost.

METHODOLOGY:

A. Read job satisfaction data from handout, "Human Behavior"

B. Write a short paper on what you want science to do.

C. Read Chapter 4 in Reason Awake.

D. Write a short paper on what the "New Technology" is and what effects it has had on you.

E. Write a critical review of Chapters IV and V in Man's Way.

F. List five things that man has a right to, or ought to, tell scientists to do.

G. Group Projects:

1. Investigate the major industries in Sun Prairie and describe how science and technology, as well as automation are being used.
2. Report on the changes in the occupational structure of American society in the last half century.
3. Interview several industrialists in the Madison area as well as union leaders concerning automation and compare their reactions.
4. Pick one social institution and present the consequences you expect from on this institution as a result of increased technology.
5. Panel discussion on "how technology has helped and hurt this high school"

6. Through role playing, develop a high school using technology to what you feel will be a realistic degree in the year 1990.

H. Listen to and be able to discuss the tape, "Technology and the Ethics of Glut".

CULMINATING ACTIVITY:

A. Through interviews develop a paper on the leisure time activities of workers who are dependent in their job on machinery to a large degree. From the information gathered, attempt to bring out the degree of boredom that is present.

EVALUATION:

A. Quality of papers assigned.

B. Class discussion.

C. Objective and subjective examinations.

TAPE:

A. "Technology and the Ethics of Glut"

VII. CONCERNS CAUSED BY SCIENCE-TECHNOLOGY

A. Environmental Threats to Man

1. Pesticides

a. Physical, chemical, and biological properties

b. Significant effects on plant and animal species

1. endocrine upsets

2. nervous system

3. effect on photosynthesis

4. genetic effects

c. alternative forms of pest control

1. sterilization

2. sex attractants

3. avoid monoculture

4. natural predators

5. pathogens

6. integrated control

d. relevant legislation

1. state

2. federal

2. Oil

a. Major oil disasters

1. Torrey Canyon incident

2. Santa Barbara spill

3. Alaska

b. Repercussions

1. Wildlife

2. Recreation

3. Photosynthesis

4. Aesthetic

c. Effects

1. Disrupt breeding

2. Reduce O_2 content and intake

3. Increase algal growth

d. Sources

1. Bilge cleaning

2. Harbor spills

a. disrupts spawning along

b. continental shelf

c. coastal waters where marine productivity is concentrated

e. Clean-up

1. Pump into containers

2. Burning

a. causes air pollution

3. containing hasn't worked well

4. detergents or dispersants sink oil where does more damage

3. Chemicals

a. Mercury

b. Lead

c. Mining and manufacturing acids

d. Chlorine

e. Others

f. Nitrogen and phosphates

4. Depletion of Natural Resources

a. Interactions between man and his resources

b. Mineral resources

c. Energy Resources

d. Water

e. Soil

5. Landscape degradation

6. Food vs. Famine

a. Nutrition and Hunger

1. Picture in America

2. World-wide implications

3. Deficiency diseases

b. Increasing world-wide food production

1. Improving yields on land

2. Food from the sea

3. Reduction of food losses

4. Novel sources of food

5. The prognosis

7. Radiation

   a. History of nuclear development.

   b. If fusion power ever is tamed and if a way is found to safely dispose of its radioactive wastes, it will supply mankind with an inexhaustible source of electricity.

   c. The promise of atomic energy's future is clouded by its violent past.

   d. For a long time secrecy policies kept the public from understanding the radioactive "side effects" of nuclear explosions.

   e. The secret finally was exposed by the accidental dusting of 23 Japanese fisherman with radioactive debris from the March, 1954 H-bomb test at Bikini.

   f. Thermal effects of heat from neutrons.

   g. Is the complex fabric of our total civilization tied into an enormously powerful, lightly triggered and poorly understood war machine?

   h. Do we understand the hazards the weapons of nuclear war present?

   i. Alternatives and value changes necessary.

8. Drugs

   a. A look at the problem

   b. Types

      1. Stimulants (Amphetamines)

      2. Depressants (Barbituates)

      3. Hallucinogens (LSD)

      4. Narcotics - Heroin, Opium

      5. Marijuana

      6. Alcohol

      7. Tobacco

   c. Effects and Side-Effects of Various Drugs

      1. Physical and/or Psychological habituation

      2. Reactions

a. Unpredictable

b. Recurrence

3. Loss of purpose, energy

4. Impaired judgment

d. Reasons for use

e. The social cost

f. The Ultimate Question

g. "Core of Existence"

9. Mis-Management or Progress

a. James Reston - "New Pessimism"

b. The two natural containers of the environment, the air and the water, finally vomited back on Americans the filth they could no longer absorb.

c. Progress is now used almost exclusively to denote changes in the "standard of living" - not the quality of life, but to abundance of things - how many manufactured objects, not higher degree of education or better health.

d. "Steady State" formula.

B. Air Pollution

1. Pollutants

a. Carbon monoxide

b. Sulfur oxides

c. Nitrogen oxides

d. Hydrocarbons

e. Particulates

1. Effect on climate

2. Greenhouse effect

3. Trends

f. SST

2. Effects of Pollutants
    a. Property damage
    b. Crops
    c. Public Health
    d. Tokyo
        1. Police take O_2 breaks
        2. Pedestrians get O_2 at vending machine
3. Major sources
    a. Internal combustion engine
    b. Other industry
    c. Agriculture
4. Smog
    a. Causes
    b. Types
        1. London type
        2. Los Angeles type
    c. Temperature inversions

C. Water pollution
    1. Striking examples
        a. Cuyahoga River
        b. Lake Erie
    2. Pollutants
        a. Industrial wastes
            1. Lead, Mercury, Chlorine
            2. Mining and manufacturing acids
                a. Strip mng. -
                    1. decapitates mts.
                    2. destroys wildlife
                    3. denudes landscape

4. chokes streams

5. rain and seepage adds deadly acids

3. Oil

4. Radioactive wastes

5. Pesticides

b. Municipal wastes

1. Garbage

2. Sewage

3. Eutrophication

a. "Build canoes with wheels on"

4. Detergents

a. Biodegradable

b. Phosphate content

c. Agricultural wastes

1. Fertilizers

a. Agricultural-nitrogen-phosphorus-washoff

b. 11,620 lbs.Pper day into Lake Michigan from State of Michigan

c. 81,380 lbs. N per day

d. Also nitrogen from automobiles - example, Lake Mendota

2. Silt washoff

3. Pesticides

a. Tremendous number of fish that cannot be sold on the open market.

3. Effects

a. Eutrophication (successive enrichment and suffocation of a lake)

1. Remove nutrients to increase oxygen content

2. By 1972, 80% of Phosphorus must be removed by sewage plants.

b. Loss of recreational facilities

c. Reduce photosynthesis in phytoplankton

d. Aesthetic pollution

e. Effects on wildlife

f. Economic loss due to lowered productivity of species

D. Solid Waste Pollution

1. Types

2. Quantity

3. Effects

4. Types of sewage treatment

a. Primary

b. Secondary

c. Tertiary

5. Recycling

E. Thermal pollution

1. Definition

2. Sources

3. Effects

4. Alternatives

F. Noise pollution

1. Meaning

2. Types

a. Airplane

b. Factory

c. Home

3. Stimuli affecting man

4. Effects

a. Steady intense noise can inflict irreversible damage.

b. Sounds not sufficiently loud to awaken sleeping people nevertheless affect their brain waves.

c. People may learn to tolerate the supersonic boom, but the

chances are very great that this adjustment will be achieved at the cost of physiological and mental damage.

d. Sociological knowledge shows that the man-hour loss of time by persons experiencing the boom and recovering from its effects far exceeds the man-hour saving of time by persons flying at supersonic speed.

5. Much noise seems amenable to technological solutions.

6. Values and opportunity costs.

G. Aesthetic Pollution

OBJECTIVES:

A. Student becomes aware of the scientific innovations that have developed in the world.

B. Student can differentiate between the benefits and risks of each innovation.

C. Student develops attitudes that will encourage him to view innovation from a long range view as well as the immediate benefit.

D. Student can objectively weigh the alternatives available in the attempt to erase the negative ramifications of certain innovations.

E. Student uses discretion in how he attempts to control the environment.

CONCEPTS:

A. There are certain risks taken, and limitations experienced, when manipulating the natural environment.

B. Resource depletion can be slowed by the development and adoption of alternatives.

C. Multiple use is a practice in which a given land area functions in two or more compatible ways.

D. Safe waste disposal, including the reduction of harmful and cumulative effects of various solids, liquids, gases, radioactive wastes and heat, is important if the well being of man and the environment is to be preserved.

E. Pollutants and contaminants are produced by natural and man-made processes.

F. Increasing human populations, rising levels of living and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

G. Natural resources are interdependent and the use or misuse of one will effect others.

H. Water supplies, both in quantity and quality are important to all levels of living.

I. The earth and life on it are greatly affected by the atmosphere.

J. Water is a reusable and transient resource, but the available quantity may be reduced or quality impaired.

K. Soil is classified as a renewable resource, but because it may take a few years to thousands of years to be "renewed", it is more practically termed a depletable resource.

L. The alternatives to war and war weapons must be considered if society is to survive.

M. Conflicts emerge between private land use rights and the maintenance of environmental quality for the general public.

M. Individuals tend to select short term economic gains, often at the expense of greater long term environmental benefits.

METHODOLOGY:

A. Pick one area of concern that deals with the environment and develop the scientific evidence showing its harmful effects. With this in-

formation, present what alternatives or methods you would use to help remedy the situation.

B. Panels to present to class on these areas:

1. Air pollution
2. Water pollution
3. Solid wast pollution
4. Noise pollution

C. Research the area of recycling resources in the private sector as well as government sector of our society.

D. Read about the major oil spills (Santa Barbara, Torrey Canyon, etc.)

E. Debate on "Negative Consumption" should or should not be a prime responsibility of all Americans.

F. Debate between the pessimists or "Prophets of Doom" and the optimists who believe that the green revolution will save mankinds.

G. Debate "marijuana should or should not be legalized".

H. Doctor speak on medical truth about drugs.

I. List ten reasons for use of drugs in order of their importance in today's society.

CULMINATING ACTIVITY:

A. Write a story with the theme being "Spaceship Earth" as defined by Adlai Stevenson in which you interject the what is needed and what must be watched out for on the "Fragile Craft".

B. Investigate and take action against any pollution your school is responsible for or contributes to. Does your school release too much black smoke? (Check city ordinances.) Does it use metal or aluminum cans in pop machines? What is done with trash from school? Do buses to and from school have adequate anti-pollution devices? Do many people who could walk to school take rides?

EVALUATION:

A. Objective examination on scientific basis for innovations discussed.

B. Subjective examination on the value judgments needed to resolve an area of detrimental influence on the environment.

C. Evaluation of papers and presentations to class in the form of panels and debates.

RESOURCES:

A. Films

1. "Air Pollution: Take A Deep Deadly Breath"
2. "First Mile Up" (urgent problem of AP and how some cities fighting it)
3. "Noise: The New Pollutant"
4. "Water Pollution - The Blighted Great Lakes"
5. "Clean Waters"
6. "The Problem with Water is People" (implications of polluted H_2O in view of population explosion and increased demands of irrigation and industry)
7. "Poisons, Pests, and People" (effects of pesticides, alternatives)
8. "The Third Pollution"
9. "Man and His Resources"
10. "Our Vanishing Lands" (conservation of land, wildlife)
11. "Progress, Pork Barrell and Pheasant Feathers" - (Everglades sacrificed to progress and politics)

B. Tapes

1. "To Hell with Posterity"
2. "The Earth Killers"

C. Readings

1. "Air Pollution" - Life Ed. Reprint
2. "Water Pollution - The Blighted GREAT LAKES", August 23, 1968

3. Progressive Magazine, April 1970

4. "Third Generation Pesticides", Carroll Williams, SCI. AM. July 1967

5. "Pesticide to Pest", Time, July 1969

6. "Pesticide Pollution, Clarence Cottam, National Parks Magazine, November 1969.

7. "An Indictment of Wide Use of Pesticides", LaMont Cole, SCI. AM. December 1962.

8. "Environment - What Can Be Done?" - Life Ed. Reprint

9. "Food and Famine", New York Times Student Weekly, April 6, 1970.

10. Resources and Man, National Academy of Sciences, 1969.

D. SIMULATION GAME

1. Balance

   a. A simulation game of ecological dilemmas

E. FILMSTRIPS AND RECORDS

1. "Drugs" (The Dream vs. The Reality)

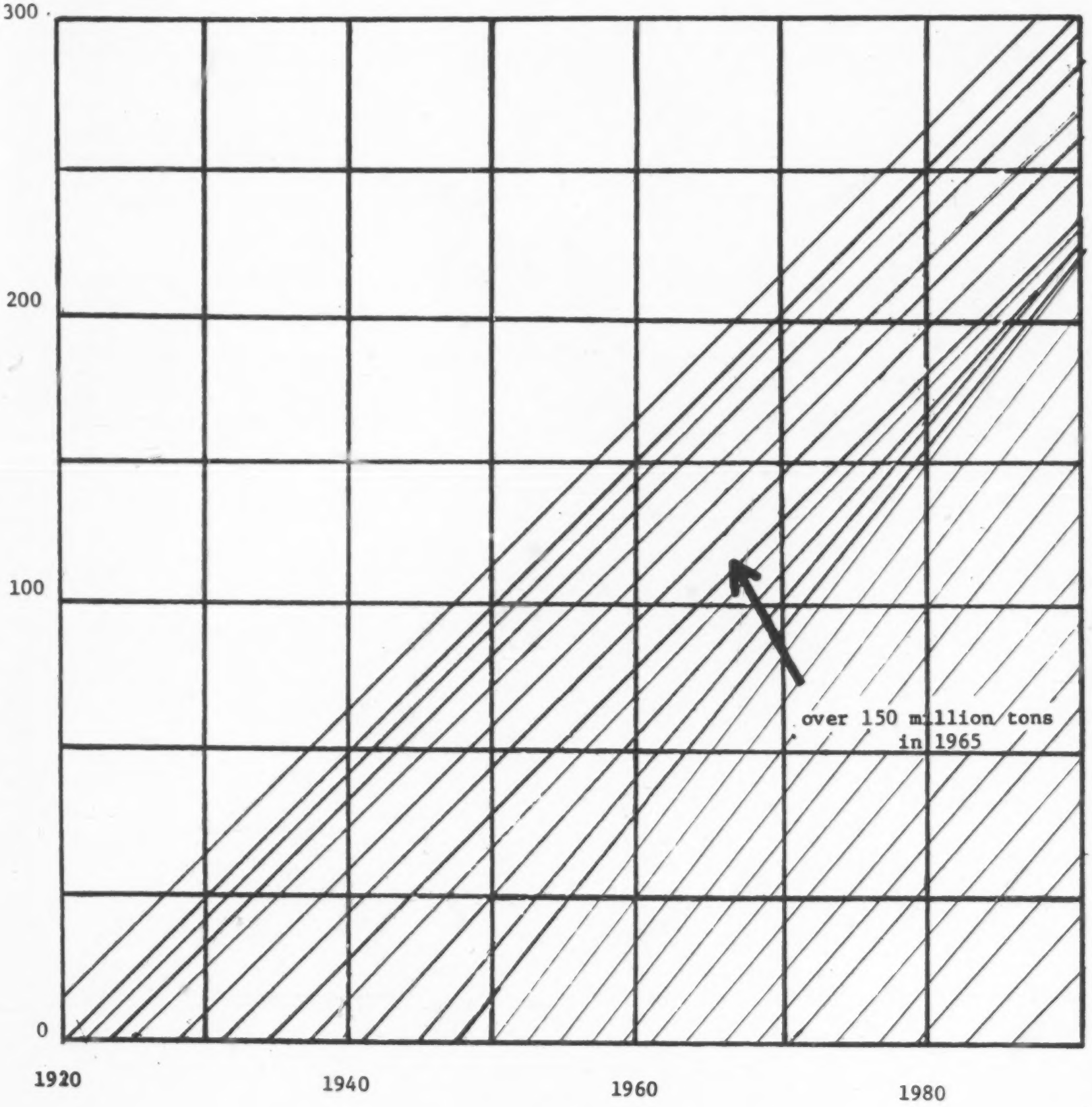
VIII. What is the Proper Role of the Scientist, Citizen, Industrialist, and Administrator?

A. Few persons are completely unaware of the dangers experienced by man in the technological world, but on the whole, the public does not appear to be greatly alarmed about them.

B. We tend to ignore progressive changes, until they reach catastrophic dimensions - we have come to tolerate air pollution, foul water, crowding, garbage, noise, and confusion in the streets.

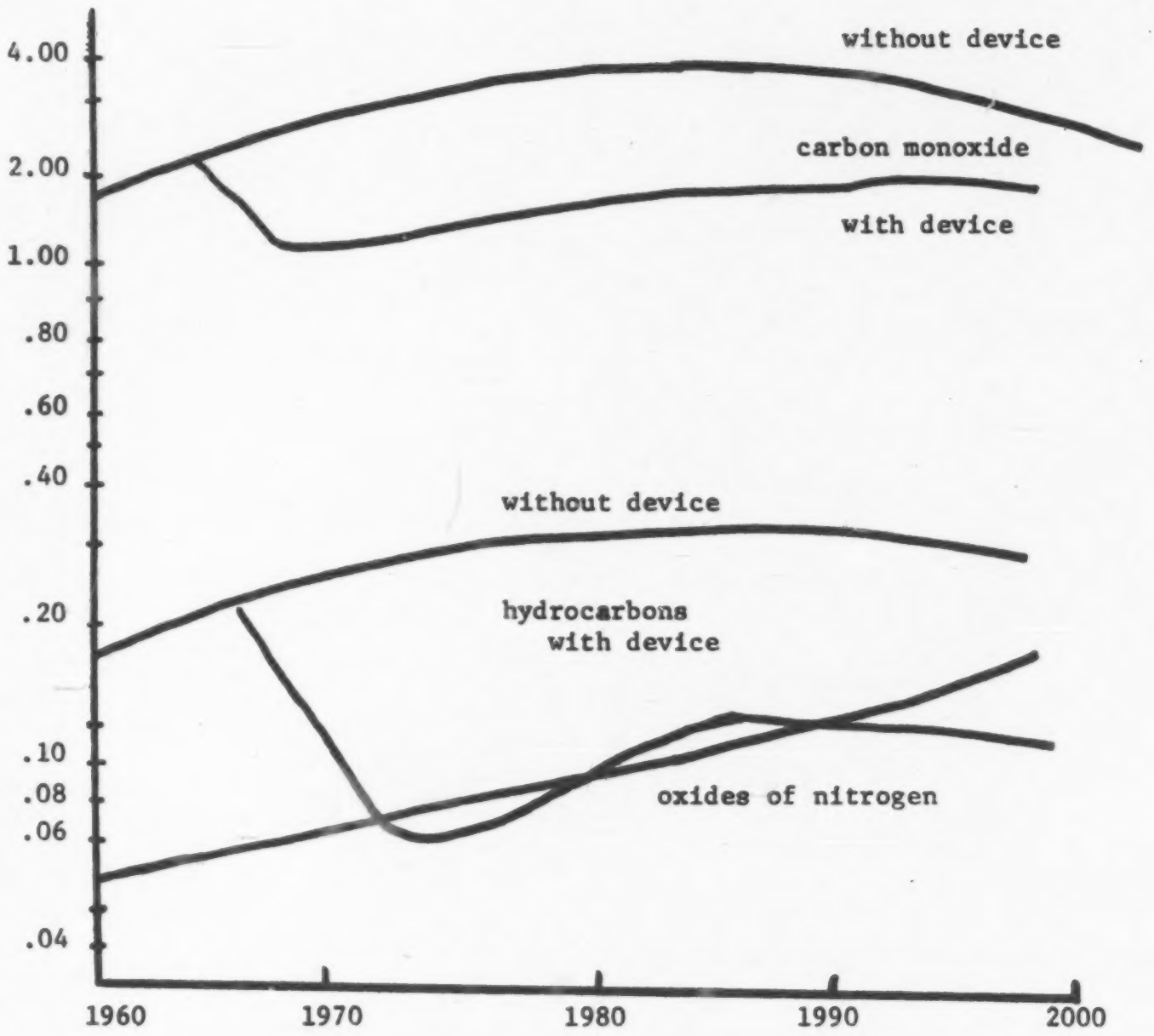
C. It is easy to blame pollution only on the large economic interests, but pollution is a by-product of our consumption-oriented society. Each of us must bear his share of the blame.

D. If we want air we can breathe and water we can drink, we must ask ourselves if the extra comfort of the latest technological whim is worth the environmental price.



Solid Waste Production in the U.S.

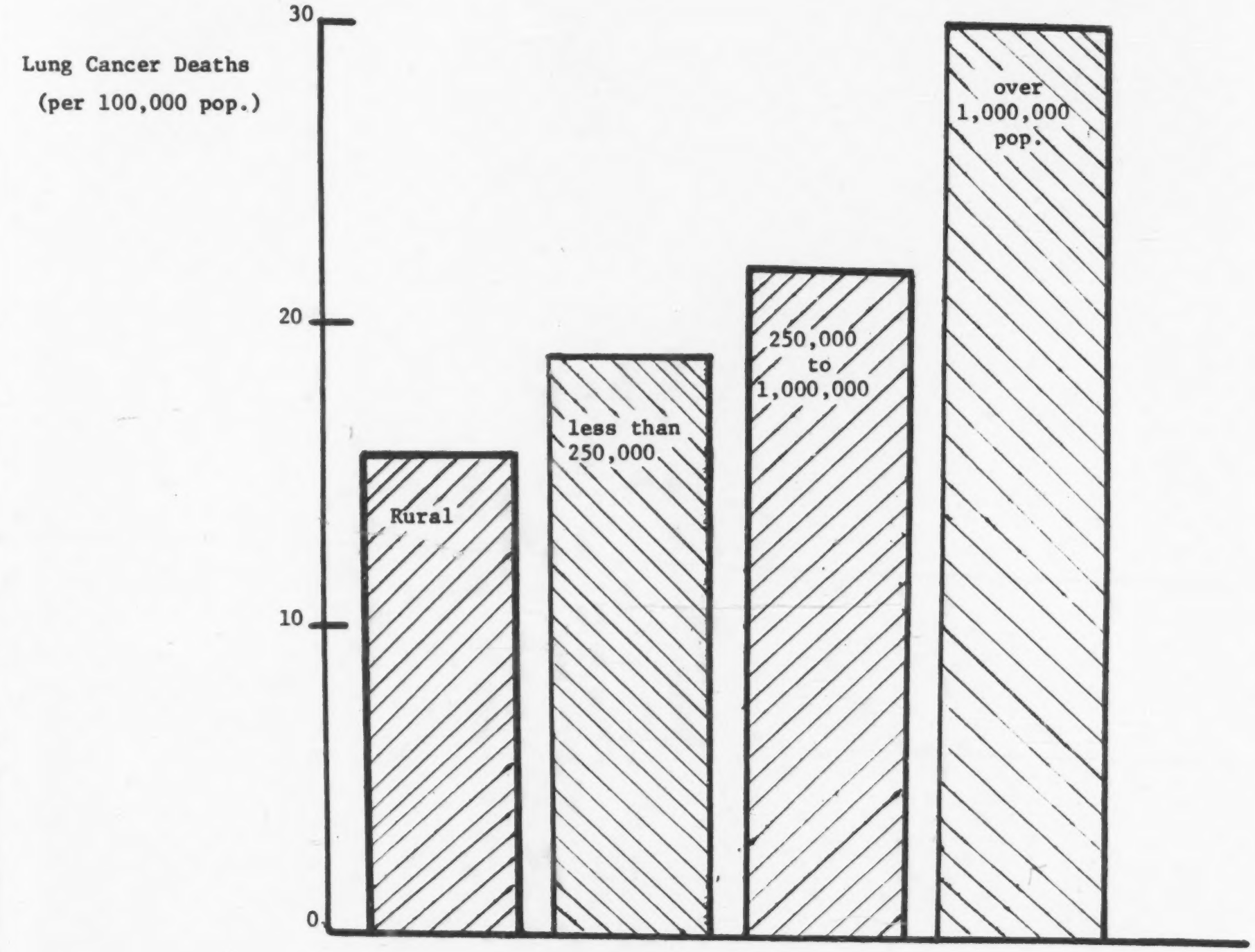
How much did solid waste production increase from 1920 to 1965? How much is it estimated to increase in the late 1980's? How old will you be by then? How will this affect your life?



Annual Motor Vehicle Emission

Why is it essential for the automobile industry to develop new devices to filter exhausts? Should the production of vehicles be stopped until these safeguards are perfected? Give reasons to support your opinions.

Bigger Cities
More Air Pollution
More Deaths



From this graph, what effect does density of population have on lung cancer? Why?

From the line graph, what is the percent rise in emphysema deaths from 1950 to 1964?

What does this tell you about air pollution?

Quality of U.S. Drinking Water

105 million people

drink water that meets Federal Standards

95 million people

drink water that is below Federal Standards or of unknown quality

What percentage of the people in the United States drink water below Federal Standards? What causes water pollution? What effects may the quality of the water have on our people? How can this be corrected?

CARBON DIOXIDE PRODUCED BY WORLD FOSSIL FUEL COMBUSTION 1900-1960

ESTIMATED PROJECTION 1960-2000

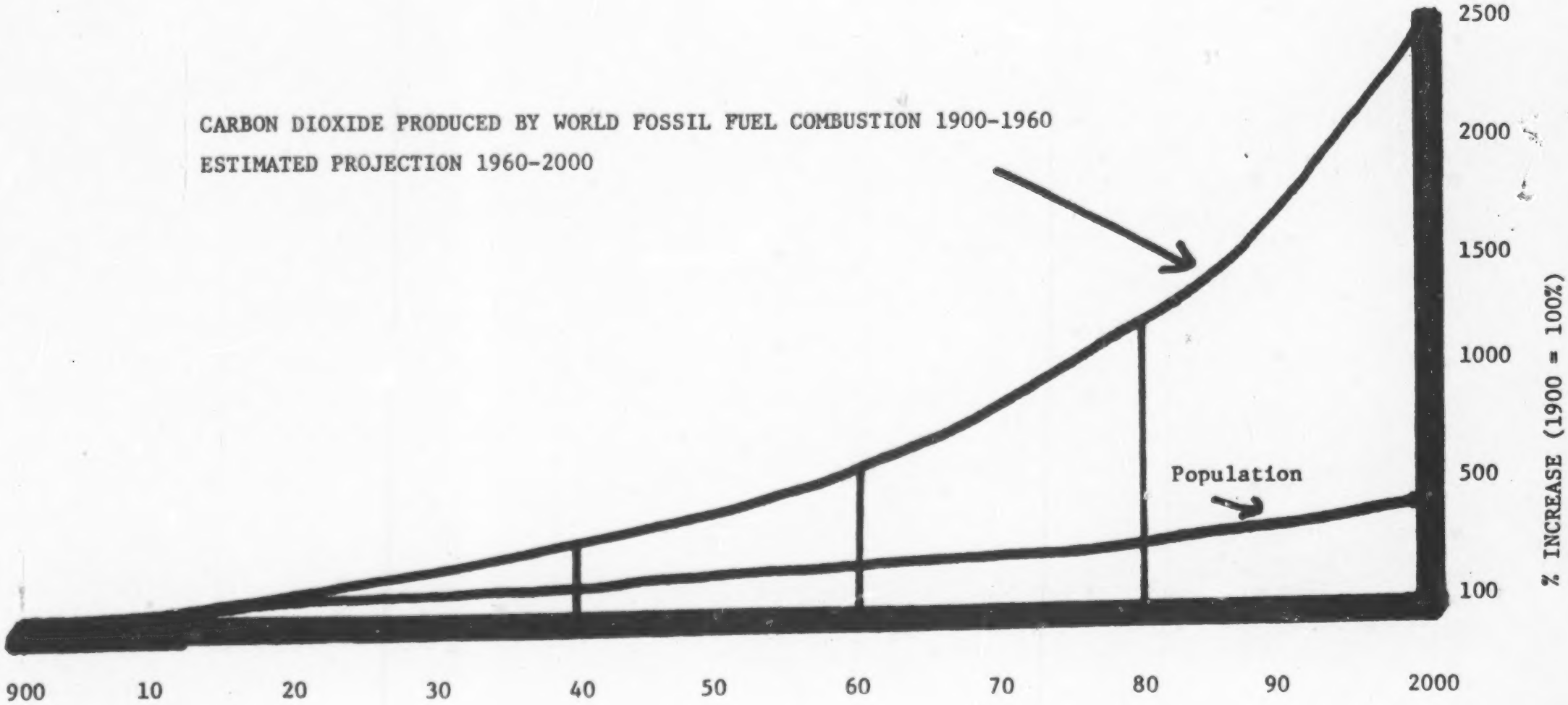
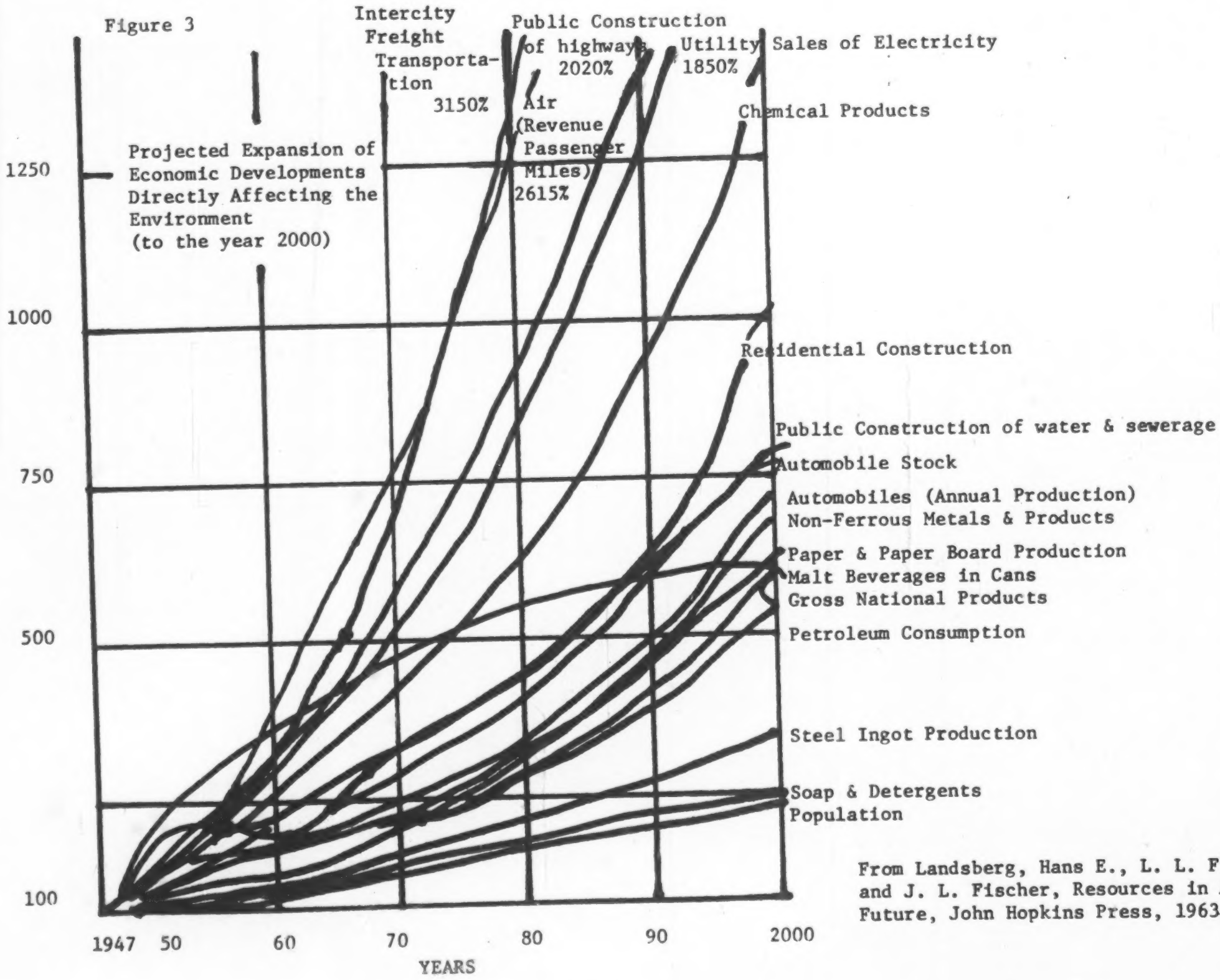


Figure 3



From Landsberg, Hans E., L. L. Fischman, and J. L. Fischer, Resources in America's Future, John Hopkins Press, 1963.

E. The decision making process between hazard and benefit must be resolved in the arena of public policy.

F. If scientists created the problem, they must be involved in solutions.

1. Did they create the problems?

2. Twice in this century American scientists have become involved in great national projects. Following each there have been long periods of afterthought, second thoughts, and doubt.

3. Atom bomb and Apollo projects.

4. In the purely scientific view the concepts of success and failure are hard to define. They rely on value systems built around beliefs, assumptions and self-evident truths.

5. If the bomb fails to go off, the laboratory would have proved the system impossible and that would be the best of good news for man - Enrice Fermi

6. Scientist dominated the Manhattan Project - engineers, politicians, military men, and large corporations dominate the Apollo Project.

G. If the issues require social, political, and moral judgments, they must reflect demands, opinions, and ethics of citizens.

1. "Ethics"

H. Should a scientist cling to the objectivity of the laboratory and try to keep political views separate from scientific duties?

1. Since World War II scientists have become very conscious of this question.

2. Do scientists have a particular moral responsibility to counter the evil consequences of their works?

a. What about their ability for rational thought which renders them to some degree detached from the emotions that encumber the ordinary citizen?

b. What if two protagonists claim to know as scientists through the merits of the methods of science, the one that nuclear testing is essential to the national interests, the other that it is destructive of the national interests, where lies the truth?

3. The citizen has begun to doubt what he used to take for granted - that science is closely connected to the truth.

a. If scientists attach to their scientific conclusions those political views or social judgments which happen to provide support for these conclusions, scientific objectivity inevitably comes under a cloud.

4. "A Nearly Paralyzing Paradox"

a. Those who in a democratic society have the duty to make the decisions - legislators, government officials, and citizens generally - are often unable to perceive the issues behind the enveloping cloud of science and technology. And if those who have the special knowledge to comprehend the issues - the scientists - arrogate to themselves a major voice in the decisions, they are likely to aggravate the very threats to the integrity of science which have helped to generate the problems in the first place.

I. Production of an Informed Citizenry

1. Scientists are just custodians of scientific knowledge. Knowledge that must be relayed to citizens in order for intelligent decisions to develop.

2. Margaret Mead: "Scientists efforts to alert citizens to issues is a new social invention".

3. But does it work?

a. Scientists have no control over news media or the machinery of government; cannot overcome the governmental self-justification

and journalistic inertia which so often impedes public knowledge about complex, confused public affairs.

4. But why all the fuss over environment today?

a. Diversionary tactic?

b. Are people sincerely concerned about environment - if not, why?

c. Can we allow a substantial amount of our society to "park on somebody else's nickel?"

J. Attempts to help

1. Educational institutions

a. Science in the common school

b. Countervailing forces

1. Conflicting values - a look at "Earth Day".

2. Mass Media

a. Value system of the mass media - how does the mass media exist?

b. Opportunities to consider.

c. Government increased activity in mass media.

3. Governmental agencies.

a. Linear "mission" orientated role of most government services.

b. Policy review as a function of the Congress.

1. Structure of congressional "system"

a. How one becomes a congressman - example of oil industry and electric cars.

c. Policy and achievements of the State of Wisconsin.

d. Policy and achievements of Dane County.

e. Policy and achievements of Sun Prairie.

4. Professional organizations

a. Public information as a secondary or primary function of AMA, etc.

5. Associations of interested individuals

a. St. Louis Project

b. Religious groups

c. Sierra Club

6. Contributions - Industry's

OBJECTIVES

A. Students critically analyze the various positions scientists, citizens, and government administrators can take towards their roles in the arena of environment.

B. Students become aware of the conflicting pressures and limitations facing each group.

C. Students develop a value system of their own in which they become active participants in making environment a viable one.

GENERALIZATIONS:

A. The management of natural resources to meet the needs of successive generations demands long-range planning.

B. Individual citizens should be stimulated to become well i[illegible]bout resource issues, problems, management procedures, and ecol[illegible] principles.

C. Conservation responsibilities should be shared by individuals, businesses and industries, special interest groups, and all levels of government and education.

D. Man has moral responsibility for his environmental decisions.

E. Knowledge of the social structures, institutions, and culture of a society must be brought to bear on environmental considerations.

F. The relationship between man and the natural environment are mediated by his culture.

G. Social values and morals influence personal conservation behavior.

H. Public opinion constitutes a control over the use of conservation practices.

I. In a democracy, a basic theory is that increasing restrictions on resource allocation and use are imposed by the consent or insistence of the people.

J. Individual citizens should be stimulated to become active in the political process.

K. We have "legal" ownership of some resources like real estate and control over others during our lifetime, but ethically we are "stewards" rather than owners of the resource base.

L. Policies, including natural resource policies, came about as the result of interacting social processes: science and technology, government operations, private interests, and public attitudes.

M. An individual must develop his ability to perceive if he is to increase his awareness and develop environmental perspective.

N. Individuals perceive different self-roles depending upon their position in the social and environmental context.

O. Man has the capability of improving society through sociology, psychology, and science.

P. Man is continually developing an ethical base for making value judgments.

Q. A knowledge of the social, physical, and biological sciences and humanities are important for environmental understanding.

R. Architecture can be one of the positively persuasive influences in developing a congenial environment.

S. A sound natural resource policy is dependent upon a flexible political system, pragmatically appraising and re-appraising policies and programs in terms of their effect upon the public interest and in light of scientific knowledge about the natural resources.

METHODOLOGY:

A. Read Chapters 6 and 7 in Commoner's Science and Technology.

B. A panel discussion by a U.S. Senator, State legislature, mayor, and a city councilman on how they view ecological problems.

C. Read "Cross-Cultural Teaching of Science" handout and write a critical review.

D. Interview a corporation executive, a manual worker, a government official and compare and contrast their views towards environment and their suggested means for solving any problems they feel exist.

E. Speaker from news media to present views on obligations of media, if any, to help with ecological problems.

F. Through research, write a paper on different social class views towards any one particular environmental problem.

G. Debate on "God will save us, we are his people."

H. Read Politics of Pollution.

I. Discuss:

1. Can technology cure or control the problems created by pollution?
2. How can production methods be changed to prevent pollution?
3. How can consumption be changed to help control pollution?
4. What economic problems does pollution produce?
   a. How can a market economy absorb the costs of pollution?
   b. Should industry be required to pay for the lion's share?
   c. Should tax incentives be sufficient for private enterprise to alter production methods for pollution abatement?
   d. How much will consumers have to pay in higher prices and higher taxes for pollution safeguards?
   e. Will the consumer and taxpayer be willing to pay?

f. Is industry the major villain in the pollution story?

g. Is the concept of "free goods" obsolete?

h. Is pollution a public or private responsibility?

J. Read Chapter 16 in Prevalence of People.

K. Read "The Good Earth and the Golden Rule" handout.

L. Read "Toward a Livable Environment" handout.

M. Read and be able to discuss the AEP pamphlet "Science and Public Policy"

N. Talk by Industrial Executive on attempts to help.

O. Read "Role of Wisconsin Paper Industry in Environmental Protection"

P. Listen to tape on Wisconsin Power & Light presentation.

CULMINATING ACTIVITIES:

A. Through research do one of the following:

1. Moratorium on technological development or use of technologies to help solve the problems technologies produce.

2. Impact of technology from the accumulated effects of technological changes underway for some time.

a. Examples

1. population explosion and medical technology

2. automobile and the urban crisis

3. disruption of ecological systems by the wholesome application of pesticides and fungicides

3. Time lag between recognition of a problem and the development of solutions.

4. Value conflicts between generations due to rapidity of change.

5. Increasing gap between the developed nations and have-not nations.

6. Alienation from traditional values.

7. What happens to the sense of self in the world of giant and pervasive man-made events? The feeling of helplessness and powerlessness when surrounded by pollution, radiation, megalopolis, etc.

8. Increased leisure - a way for man to find or lose himself?
9. Role of churches in an increasingly rationalized and technological society.
10. Development of ways to assign priorities and revise costly efforts without institutional disruption.
11. The new technologies - a challenge to the adequacy of the traditional disciplines for dealing with the kind of world they have helped to create.

EVALUATION:

A. Class discussion

B. Quality of papers

C. Quality of presentation

D. Subjective examination

RESOURCES:

A. Life Reprint Series - "Environment: What Can Be Done?"

B. Film

1. "How A Scientist Works" (BAVI)

C. Tapes

1. "The Earth Savers"

2. "Progress Means Pollution"

TAPES FOR COURSE "SCIENCE & HUMAN VALUES"

SURVIVAL

A low-keyed but emotional report by Eddie Albert, actor and conservationist, of the tragic effects he has himself witnessed of our indiscriminate violation of nature. Describing the perils of pollution, Mr. Albert underscores our last chance for turning the danger signals into opportunities for survival. (27:01)

THE EARTH KILLERS

Physicists can blow up the world; bacteriologists can destroy it by disease; pollution can suffocate it; and a population explosion can starve it to death. Science must come under public control while time still remains. (28:20)

THE EARTH SAVERS

Ecology has replaced motherhood as the all-embracing issue for radicals and conservatives and politicians of all persuasions. Yet the volume of words spoken is nowhere matched by dollars allocated to save the enrichment. Only the electorate, by moving government onward, can save the earth. (28:58)

PROGRESS MEANS POLLUTION

The price of an industrial society is pollution. Immediate attention to these thermo-generated problems is urgent if we are to keep our high standard of living from becoming a high standard of dying. Discusses possible solutions; legislative, judicial, and political. (40:26)

TO HELL WITH POSTERITY

"Hell is a city much like London, a populous and smoky city." Today, science and technology seem hell-bent on creating bigger and smokier cities, on defiling the waters with waste products; on indulging in atom-foolery until we all become victims of slow but insidious smothering and radiation. Makes a case for the need to apply social responsibility to scientific discovery instead of racing pell-mell to a finish line that may spell the end of civilization as we know it. (29:13)

THE POLITICS OF ECOLOGY

The now deceased Aldous Huxley says the most pressing problems facing democracy in the next ten years are the population explosion, the arms race, and rising nationalism. He suggests that a shift in our attention from bad politics to enlightened ecological understanding may help prevent war. (44:00)

TECHNOLOGY AND THE ETHICS OF GLUT

The discussants here clarify the real complexities behind the glib assertion that man can and should control his population and products, but they find little agreement beyond clarification. "There is no such thing as uncontrolled technology"..... poor dark people see contraceptives as a weapon against them." (51:11)

Center for Democratic Institutions

Santa Barbara, California

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2. No Deposit, No Return, Huey Johnson, Addison-Wesley
3. Reason Awake, Rene Dubos, Columbia University Press
4. Science and Survival, Barry Commoner, The Viking Press
5. The New Technology and Human Values, John Burke, Wadsworth Publishing
6. The Environmental Handbook, Garrett DeBell, ed., Ballantine Books
7. The Population Bomb, Paul Ehrlich, Ballentine Books
8. The Politics of Pollution, Clarence Davies, Pegasus
9. The Ecology Controversy (Opposing Viewpoints), Gary E. McCuen & David L. Bender, Greenhaven
10. A Moment in the Sun, Robert & Leona Treinow, Ballantine Books
11. Population, Resources, and Environment, Paul & Ann Ehrlich, Freeman & Company
12. The Human Zoo, Desmond Morris, McGraw Hill Book Company
13. So Human an Animal, Rene Dubos, Scribner & Sons
14. The Prevalence of People, Marston Bates, Scribner & Sons
15. America's Changing Environment, Editors Roger Revelle & Hans Landsberg, Houghton-Mifflin Company
16. Resources and Man, National Academy of Sciences, Freeman & Company
17. The Subversive Science: Essays in the Ecology of Man, Paul Shephard

PERIODICALS

Science	Natural History
Scientific American	Life
Time	New Republic
Progressive	National Wildlife
National Geographic	Newsweek